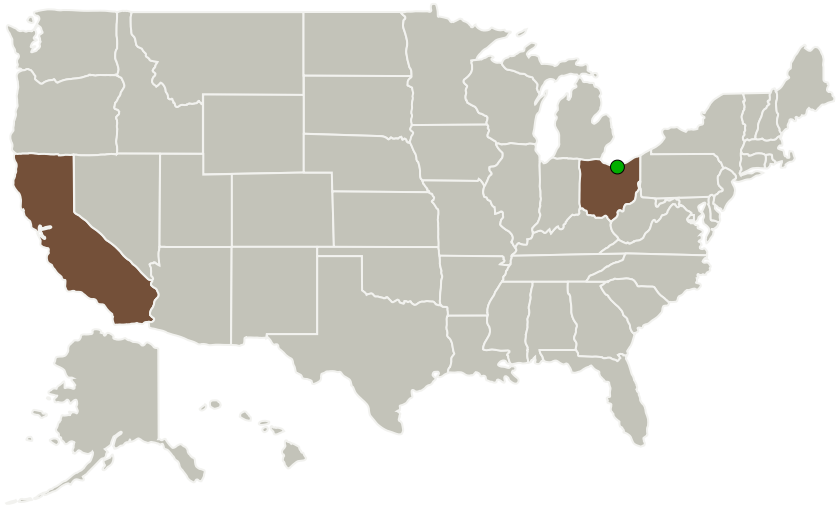
Unibody Composite Pressurized Structure (UCPS) for In-Space Propulsion, Phase I

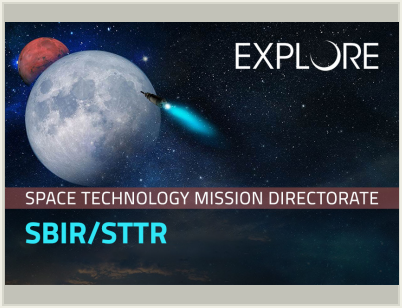
Completed Technology Project (2010 - 2010)

Project Introduction

Microcosm, in conjunction with the Scoprius Space Launch Company (SSLC), will develop a Unibody Composite Pressurized Structure (UCPS) for in-space propulsion that constitutes a clean break from traditional spacecraft design by combining what were traditionally separate spacecraft primary and secondary support structures and metal propellant tanks into a single unibody, all-composite construction that is stronger, much lighter weight, more robust and reliable, and capable of supporting much higher pressures and smaller volume than previous approaches. The single, all-composite structure will include linerless, high-pressure propellant tank(s), composite bosses, flanges, longitudinal and circumferential stringers with integral shelves, holding mechanisms, and attach features to support all of the spacecraft equipment and replace the separate, mission-critical primary support structure, tanks, struts, straps, braces, clamps, and brackets traditionally required to hold subsystem parts in place. The new structure has nearly 0 CTE over a temperature range from cryogenic to over 100 C. Phase I will determine requirements, create a preliminary UCPS design relevant to a potential SMD mission, and test material compatibility with various in-space propellants. Phase II will build two UCPS structures employing test masses for spacecraft components, and complete qualification and burst testing on one of them (including 0-g testing).

Primary U.S. Work Locations and Key Partners





Unibody Composite Pressurized Structure (UCPS) for In-Space Propulsion, Phase I

Table of Contents

Unibody Composite Pressurized Structure (UCPS) for In-Space Propulsion, Phase I

Completed Technology Project (2010 - 2010)

Organizations Performing Work	Role	Type	Location
Microcosm, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Hawthorne, California
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140034)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Microcosm, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Markus Rufer

Co-Investigator:

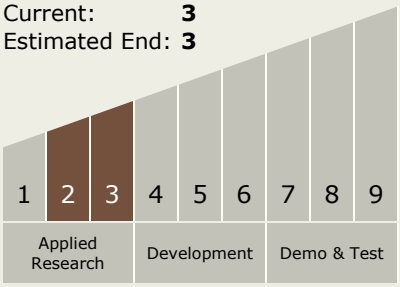
Markus Rufer

Unibody Composite Pressurized Structure (UCPS) for In-Space Propulsion, Phase I

Completed Technology Project (2010 - 2010)

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System